

# On The Accurate Calibration of The SeaWinds Radar Antenna: A Cylindrical Near-Field Measurement Approach

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A multi-polarization, multi-incidence angle conical scanning Ku-band radar antenna is currently being designed and calibrated at **the** Jet Propulsion **I** laboratory for the SeaWinds **scatterometer** instrument. The radar antenna is an elliptical parabolic reflector with two independent beams pointing at 40 (1.6° x 1.8° **beamwidth**) and 46 degrees (1.4° x 1.7° **beamwidth**) from nadir to provide a cross track measurement range of 900 km. **The** instrument **measures** echo signals from the sea surface from which the wind speed and its direction may be derived. Additionally, the spaceborne **flight** may simultaneously cover sea and ice surface or **sea** and land surface, and result in locally larger reflectivity within the radar beam. To calibrate the radar's performance, it is essential to accurately determine the antenna gain and three dimensional radiation characteristics over wide angular range. Such characterizations may be performed on a far-field range or in an indoor near-field **measurement** facility. Among the advantages of the latter is that the antenna that is to **be** calibrated is in a **controlled** environment.

In this paper, a cylindrical near-field measurement approach for **the** SeaWinds radar antenna calibration is presented. To achieve the desired accurate calibration, generalized measurement error models are implemented to determine the effects of near-field measurement bias errors on antenna gain and far-field radiation patterns. These errors include scan area truncation, **receiver** non-linearity and drift, probe tower and antenna under test alignment. This approach has provided proper **guidelines** to fine tune the indoor range. In **order** to verify the range calibration accuracy, a highly calibrated radar, **the** NASA **scatterometer** flight **spare**, was measured in **the** cylindrical near-field range. The antenna gain was in an **excellent** agreement for both horizontal and vertical polarizations. The SeaWinds radar antenna was then **measured** and its performance parameters, gain, three dimensional radiation patterns, **beamwidth**, and pointing have been obtained for both polarizations.